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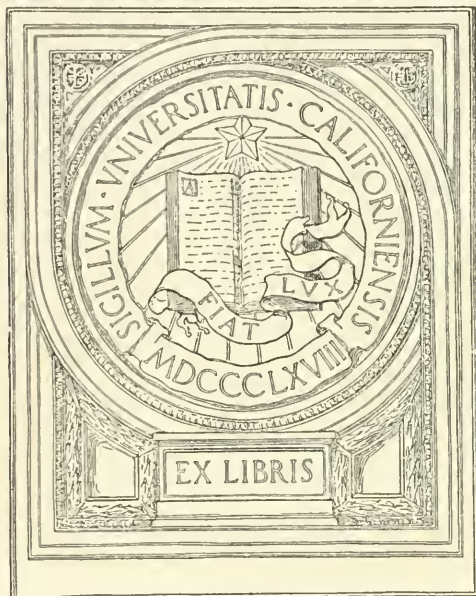


Mining Securities

by

Pope Yeatman  
and  
Edwin S. Berry

UNIVERSITY OF CALIFORNIA  
AT LOS ANGELES



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Dr. and Mrs. A.B. Pierce

# Mining Securities

By

POPE YEATMAN, E. M.

Consulting Mining Engineer. Consulting Engineer for M. Guggenheim's Sons, Guggenheim Exploration Company, Nevada Consolidated Copper Company, Chile Copper Company, and Braden Copper Company, 1906-1916. Director, Non-Ferrous Metals Section, War Industries Board, 1918 to 1919

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AMERICAN INSTITUTE OF FINANCE



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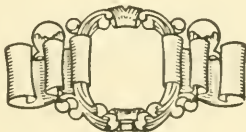
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A  
"COMPLETE EDUCATIONAL COURSE"  
IN THE SCIENCE OF  
MAKING MONEY MAKE MORE MONEY

This list is arranged in the order of proper reading. The books are accompanied by a series of test questions, key problems and analyses outlines, enabling the student to apply the knowledge acquired to immediate stock market and investment conditions.

- |  |  |
|--|--|
| 1. <i>Developing Financial Skill</i>           | 11. <i>Investment Securities</i>                                 |
| 2. <i>Forces Which Make Prices</i>             | 12. <i>Business Cycles</i>                                       |
| 3. <i>Manipulation and Market Leadership</i>   | 13. <i>Measuring and Forecasting General Business Conditions</i> |
| 4. <i>Handling a Brokerage Account</i>         | 14. <i>The Technical Position of the Market</i>                  |
| 5. <i>Market Information</i>                   | 15. <i>Money and Credit</i>                                      |
| 6. <i>The Essential Features of Securities</i> | 16. <i>Business Profits</i>                                      |
| 7. <i>The Value of a Railroad Security</i>     | 17. <i>Launching a New Enterprise</i>                            |
| 8. <i>Industrial Securities</i>                | 18. <i>Securing Capital for Established Enterprise</i>           |
| 9. <i>Oil Securities</i>                       | 19. <i>Internal Financial Management</i>                         |
| 10. <i>Mining Securities</i>                   | 20. <i>Search for Bargains</i>                                   |

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## CHAPTER I

### SPECULATIVE POSSIBILITIES IN MINING SECURITIES

#### **Public Interest in Mining Securities**

Interest in mines and mining securities is of three kinds: First, an interest due to hope and belief in large and unusual profits. This is entirely speculative and is based on more or less romantic ideas, or on what might be called "hunches." Second, an interest based on the actual industrial and commercial conditions of mining properties. Third, a combination of the two.

In the second category might be placed the securities of companies mining well-tested coal, iron deposits, and quarries, in which the element of chance is reduced to a minimum. To these may be added the securities of companies operating well proved deposits of low-grade copper ore, whose extent, metal contents and metallurgical treatment have been thoroughly and intelligently tested and determined.

#### **Different Types of Speculation**

Among the most highly speculative ventures are those entered into on account of tales of ignorant or dishonest men regarding far-distant and inaccessible deposits, especially of the precious metals and gems. Little less speculative are the securities of mines of great intrinsic worth, but in which, owing to variations in the value of the ore in different parts of the mine—in one place high grade in another low—it is possible for a dishonest or ignorant management to make use of these variations to manipulate the price of the securities. This is often accomplished by mining the high grade ore at one period and the low grade ore at another period, so as to make the public believe that the property had greatly increased in value, or that the bottom had dropped out.

In addition, by reason of certain state laws under which some mining companies have been incorporated, it has been possible to levy assessments as well as pay dividends. The market has often been depressed by calling for assessments, at which times stock could be repurchased by "insiders" at a low figure; and later on prices would be boosted by declaring dividends, when the "insiders" would unload their holdings.

### **Mining Booms**

A good illustration of speculative booms is given in the shares of the Bonanza Mines of the Comstock Lode at Virginia City, Nevada.

The first discovery was made in the early part of 1859, and from that time until 1901 it is reported that a recovery of about \$351,000,000 was obtained. Thefts, leakages due to loose and dishonest management, etc., were responsible for the diversion of great sums, and it is probable that the actual returns would have amounted to around half a billion dollars, had it been possible to obtain an accurate statement of production. During this period assessments amounted to \$78,845,737, and dividends aggregated \$133,178,390, as shown by the following tables. By far the largest proportion of dividends were paid by four companies. Many of the others were what are commonly called "wild cats", but even securities of the best of the mines were manipulated. Levying of assessments was one of the methods employed.

#### **TOTAL ASSESSMENTS AND DIVIDENDS OF MINES OF**

##### **COMSTOCK LODE**

<b>Mine</b>	<b>Total Assessment</b>	<b>Total Dividends</b>
Utah Consolidated .....	\$525,000	.....
Sierra Nevada .....	6,060,910	\$102,000
Union Consolidated .....	2,725,000	.....
Ophir .....	4,818,748	1,592 800
Mexican .....	2,375,390	.....
Consolidated California and Virginia .....	3,443,100	84,234,800
Best & Belcher .....	2,736,833	.....
Gould & Curry .....	4,780,250	3,837,600
Savage .....	7,382,600	4,460,000

Mine	Total Assessment	Total Dividends
Hale-Norcross . . . . .	\$5,773,480	\$1,850,000
Chollar . . . . .	2,142,800	750,000
Potosi . . . . .	2,259,120	.....
Bullion . . . . .	3,142,000	.....
Alpha . . . . .	328,650	.....
Exchequer . . . . .	1,023,000	.....
Imperial Consolidated . . . . .	2,291,000	500,000
Challenge Consolidated . . . . .	455,000	4,800,000
Confidence . . . . .	563,596	204,000
Yellow Jacket . . . . .	5,866,000	2,196,000
Kentucky . . . . .	128,450	1,350,000
Crown Point . . . . .	3,030,000	11,903,000
Belcher . . . . .	3,658,600	15,397,200
Segregated Belcher . . . . .	386,000	.....
Overman . . . . .	57,500	.....
Caledonia . . . . .	3,255,000	.....
Justice . . . . .	3,705,000	.....
Alta . . . . .	3,712,510	.....
Silver Hill . . . . .	2,220,200	.....
	<hr/>	<hr/>
	\$78,845,737	\$133,178,390

(From Report of Director of Mines on "Precious Metals of United States"—1902).

In an article in "Cassier's Magazine," of September, 1901, by T. A. Rickard, entitled: "The Comstock of Today," he states that "the price of the shares of the Sierra Nevada Mine rose in eight months from 50 cents to \$275 per share. This was in 1882."

After 1901, little or nothing was done on the Comstock, and the mines were allowed to fill with water. In the last few years, however, there has been some activity and a further search made for bonanzas, but the glorious past of the Comstock Mines as a locus of feverish speculation is no more.

## Mines of the Transvaal

The speculative booms of the gold mines of the Rand in South Africa first represented the gambling ventures that are common with new discoveries of precious metals. Later, as more work was done and greater knowledge of real conditions

was obtained, the wildly speculative feature disappeared, and the investment was based primarily on real values and, in most cases, on a reasonably clear idea of tonnages, approximate assay values, working costs, life of the mines, percentage of extraction, profits, etc. The gold deposits, occurring in rocks of sedimentary origin, possessed to some degree the regularity of coal seams as to thickness and great area, and were, for gold ore, wonderfully regular as to assay values—far greater regularity than is experienced with vein mines.

This resulted finally in the propositions becoming more of the nature of industrial or manufacturing enterprises than is usual in the case of mines.

The speculative feature lay in the promising conditions under which the stocks were issued, the possibility of increased tonnage in the operations of mines not yet developed or only partially so. The uncertainty regarding the possibility of bad or dishonest management was reduced to a minimum, so that great confidence was felt in the directors and in the engineers who reported on the properties.

While the Rand presented an unusual type of gold mining, minimizing risks and at the same time limiting possibilities, ordinary gold mining has been and will continue to be an adventurous pursuit, "courted by the bold and avoided by the timid."

As a matter of general information, it may be stated that the ore in the Rand Mines occurred in distinct beds, in quartzite conglomerate, dipping in many cases almost vertically at the outcrop and flattening to, roughly, thirty degrees.

The first mines at Johannesburg were started on the outcrops, and during the opening up of these, and in the earlier operations, occurred the first speculative period. The second speculative period began with the flotation of the so-called "deep-level" properties, which properties it was believed would contain the continuation of the ore-bodies on the dip,\* it being the belief of the engineers that the ore would continue in grade and thickness at the greater depths.

\* "Dip" denotes the inclination of a bed or vein measured in degrees from the horizontal. By "strike" is meant the direction of the bed or vein at the outcrop measured on the horizontal.

As more knowledge from actual work was obtained, the enterprises became less and less speculative and more in the nature of industrial operations. Nothing of the manipulation and sharp practices of the Comstock was experienced on the Rand. Full and reliable reports were frequently and regularly made by the engineers and directors, and in the course of operations no attempts were made to mine poor ore to depress the market, or rich ore to inflate it, the plan being, as far as possible, to run ore of the average grade of the mine from month to month. The management was intelligent, honest, and careful of the rights of the stockholders. The shares, of course, fluctuated over more or less long periods of time, but there were no such violent fluctuations as were experienced by the Comstock shares.

### **Mining Booms Prior to 1854**

In 1854, Whitney, a very celebrated geologist of that day, published "*Metallic Wealth of the United States*," and the following are extracts from his Introduction, illustrating the conditions at that time, but which, we believe, have been greatly improved in our day:

The facility with which the public allows itself to be deceived in regard to everything connected with mining, is as remarkable as the machinery by which the swindling speculation is organized and brought into successful operation. The locality is selected and visited by some very distinguished scientific geologist, who for a sufficient consideration will write a sufficiently flattering report, and demonstrate the absolute certainty of success. The value of the mine is fixed at an enormous sum, and divided into one or even two hundred thousand shares; the company is organized and the stock brought into the market. Every means possible is then taken to inflate its value; fictitious sales of ore are announced; the most flattering reports are received from the mine and published in all the newspapers; the president of the company, who, perhaps, had never seen a mine before in his life, and who may therefore be excused for mistaking iron for copper pyrites, or perhaps even for gold, visits the scene of action, and finds the surface literally covered "with stacks of ore"; a series of dividends are announced as about to be paid, or perhaps, even, the ore or metal from a neighboring mine is purchased with a part of the capital paid in, and sold, and a dividend declared "from the proceeds of the mine"; the whole machinery of fictitious sales of stock is put in motion, the stock rises, and the promoters

of the enterprise benevolently allow the public to step in and share with them in the magnificent profits which are certain to accrue.

As soon as a sufficient quantity of stock has been thus disposed of, and the getters-up of the scheme have pocketed the proceeds of their skilful manoeuvring, the natural results follow; the stock, no longer artificially kept up, begins to droop; one after another the deceptions which have been practised become suspected; the unfortunate holders rush to dispose of their shares, but it is too late. The property which a few days before was quoted at hundreds of thousands can now hardly be given away; the unfortunate victims having nothing left as the tangible evidence of the brilliant dividends promised but the elegantly engraved stock certificates, and the equally valuable reports by which they were deluded.

And yet the mine, thus made the object of speculation and perhaps abandoned in disgust, may be really of value and capable of being worked so as to pay a moderate profit on the capital actually invested in its development. But the idea was given out in the beginning of the enterprise that it could be made profitable at once, and because this has not been the case, the holders of the stock lose all confidence and refuse to furnish the capital, without which hardly any mine, however rich it may be, can be put into a condition in which it can for any length of time be worked with profit. The system which prevails in this country of chartered companies with a large number of shares, seems especially adapted to make the mining business, which contains so much of the lottery element of uncertainty in it, a mere object of stock speculations.

The records of the last few years (prior to 1854) show almost without exception that companies with large fictitious capital and an enormous number of shares, have been got up for the purpose of swindling the public, and not for bona fide mining purposes. It may be laid down as a universal rule, that the stockholders in a mining enterprise should be kept fully informed in regard to the expenditures and operations of the company. A frank and full publication is the only guarantee of sincerity and good faith. When these things are more generally understood and the public refuses any longer to be victimized, we may expect to see a less noisy but far more effective development of our mineral resources than we have yet had.

Prior to the date when Whitney wrote, the great gold excitement of 1849 in California had occurred. Previous to that the Lake Superior speculations of 1845-46 were seen which were, as Whitney states, "years of wild excitement and hazardous investment."

Upon such flimsy foundations were finally built up the great ventures which have resulted in the wonderful copper mines of the Lake Superior region—marvelous business enterprises, well and honestly managed, but started by speculation of the wildest and, in many cases, the most dishonest nature.



## Development of the "Porphyry Coppers"

The "porphyry coppers," whose securities were issued before the fullest development was reached have been less speculative. Their introduction to the public was accomplished without the great fluctuations previously connected with mining shares. The advances in the price of these securities has been due to developments proving great enlargements of ore-bodies and success in treatment of their ores.

The following table shows certain vital factors among some of the more important so-called "porphyry coppers"—the dividends paid by these companies to December 31, 1919, and the periods during which the properties have been operated, as well as other information concerning earnings per share. They give a clear idea of the great value of certain mining enterprises.

## Study of Values Essential

No one should make investments without knowing something about the business into which he wishes to put his money. In mining securities this means a knowledge of geological conditions obtained from reports of engineers in whom he has reason to place his trust. An intelligent study of the financial conditions of the ventures, as shown in the company's statements, should also be made. It is thus possible, by careful consideration of information which should be at hand to obtain an accurate idea of the company's present condition and its future possibilities. This will prove a material aid in deciding whether or not the mining security presented has sufficient merit to warrant purchase.

The mining industry has become so enormous and of such attractiveness and stability as to exhibit, when proper care is exercised, investments of great worth. Through greater publicity as to the financial condition and operations in general, it has become possible for the would-be investor to look more intelligently and with a greater feeling of safety into mining securities. Formerly, it was more or less like "buying a pig in a poke," the compelling force being due to the spirit of gambling rather than of reasoning.

## Mining Securities

	Utah Copper Co.	Nevada Cons.	Chino Copper	Ray Cons. Copper Co.	Miami Copper Co.	Inspiration Cons.
Began operating .....	1905	1907	1911	1911	1911	1915
Issued capital stock (shares) .....	1,624,490	1,999,457	869,980	1,577,179	747,114	1,181,967
Par value per share .....	\$10.00	\$5.00	\$5.00	\$10.00	\$5.00	\$20.00
Bonds .....	None	None	None	None	None	None
Tons of ore in reserve at beginning of operations .....	20,000,000	14,432,962	54,970,646	77,314,470	18,677,000	97,143,000
Tons of ore in reserve at end of 1919 .....	368,501,300	66,414,129	94,781,525	84,736,384	53,054,349	77,477,123
Average percentage copper per ton of ore in reserve:						
Beginning of operations: .....	2.00%	1.97%	2.24%	2.17%	2.58%	1.63%
End of 1919 .....	1.37%	1.563%	1.62%	2.063%	1.40%	Not known
Dry tons of ore milled:						
To end of 1919 .....	83,783,423	32,612,213	19,654,275	21,815,199	12,302,929	19,248,182
Average percentage of copper recovered:						
Beginning of operations .....	65.61%	65.50%	61.63%	63.10%	73.37%	79.95%
End of 1919 .....	78.46%	70.49%	65.67%	79.45%	82.38%	74.36%
Total net lbs. of copper produced 1905 to end of 1919 .....	1,444,255,848	711,369,001	466,261,930	512,470,288	364,225,358	398,363,636
Net profit, misc. income, dividends on investments, etc., to the end of 1919 .....	\$155,639,833.36	\$55,501,589.28	\$43,232,008.94	\$41,010,615.04	\$30,032,163.00	\$44,726,073.00
Total to Dec. 31, 1919 per share .....	\$100.85	\$27.68	\$49.88	\$25.91	\$40.19	\$37.84
Total disbursements to stockholders to Dec. 31, 1919 .....	\$101,762,722.50	\$45,269,023.85	\$29,012,982.00	\$23,835,441.67	\$21,462,828.00	\$34,846,805.00
Total per share .....	\$64.75	\$22.65	\$33.40	\$15.325	\$28.73	\$29.48
Quick assets over quick liabilities, Dec. 31, 1919:						
Total .....	\$27,303,555.39	\$10,294,674.93	\$4,444,384.05	\$8,463,588.61	\$6,239,989.00	\$9,145,256.00
Per share .....	\$16.81	\$5.10	\$5.11	\$5.37	\$8.35	\$7.75

He who, in these days would enter the "mining game" must know the essential features of the venture and how to test the value of the securities. The necessary data regarding any legitimate undertaking should be placed at his disposal in order to intelligently guide him.

Secrecy as to conditions, which might in extreme cases have piqued the curiosity of the investor to search the unknown—but which should really make him sheer off and refuse to go blindfolded, is no longer to be countenanced. Every investor should choose the security of the company which gives the fullest information concerning its ore reserves, operations, and financial conditions. With this understanding, let us first consider the basic features of the industry.



## CHAPTER II

### GEOLOGICAL CONDITIONS

#### Ore Deposits

Ore reserves may be variously classified as to: First, the main metal of value; and, second, the structural or geological condition. Under the first heading we have deposits of gold, silver, copper, lead, zinc, nickel, tin, etc., though one metal may run into the other. In some mines the values lie in as many as three or four metals. Numerous mines of the West contain gold, silver, copper, lead, and zinc, all in commercial quantities, or in quantities not commercial as to a single metal but decidedly so when two or more of the metals are considered. Some mines have started under the name of one metal and have later become of value due to still another metal alone, or combined with the first metal under which it was mentioned.

The copper mines at Ducktown, Tenn., were first opened as iron mines and several blast furnaces were erected for the treatment of the oxidized iron ore. When the sulphide ore was approached, copper came in as enriched cuprite and metallic copper, and caused trouble in the iron metallurgy. Later the ore was treated for copper, and still later for sulphur, in the form of sulphuric acid, also for copper, and in the future iron will again also become one of the mine's commercial metals.

#### Causes of Changing Conditions

These changes have been due, in some cases, to a decrease in the amount of one metal in the ore and an increase in another. In still other cases it has been due to an almost complete lack of one metal in the upper workings but later found in commercial quantities at depth.

Changes have also been due to a combination of the above with, in addition, a change of conditions which made possible the

treatment and marketing of a metal which previously, due to lack of transportation, distance from markets, lack of demand, etc., or lack of proper metallurgical process, could not be worked commercially. Such was the case at Leadville with the zinc ores.

The reopening or rejuvenation of some mines in the Leadville district and in Mexico resulted from the discovery, or rather realization, of the value of carbonate or silicate of zinc, which in the early days had been avoided in mining, principally because of penalties exacted by the smelters, and because, in those days, there had been no market for the oxidized zinc ores. The opening up of these zinc ore bodies was in reality equivalent to a discovery.

### Structural or Geological Classification of Ore Deposits

Avoiding a purely technical classification, the following is given to cover, in a more popular way, the common classes of ore deposits:

*Placers:* These represent alluvial detritus resulting from disintegration of older rocks whose constituents have been removed from their original locations and rearranged by the mechanical agency of water.

These are common to metals or ore which withstand weathering to a marked degree, in not being easily soluble in acids. The values are in the residues left after the wearing away and removal of the country rock or the associated vein material of a more soluble nature, or of a lower specific gravity. The principal ores found in such deposits are metallic gold, the platinum metals, tin, and specular and magnetic iron.

Mines illustrating the above are the hydraulic and dredging gold placers of California, the Klondike, Nome, the Urals of Russia and Siberia; and, in the case of tin, the tin placers of the Straits Settlements, of Bolivia and Africa.

*Bedded Deposits:* Bedded deposits are first, those in which the ores were originally laid down in bedded form and later covered by strata of shale, limestone, etc., and second, those in which the ore minerals have replaced the non-metallic minerals of which the original rock bed was completed.

As an illustration of the first may be mentioned coal, iron ore, nitrate, sulphur, and salt deposits; and of the second, replacement of beds of non-metallic minerals by metallic minerals, illustrated by the iron mines of the Mesaba Range of Minnesota, by the lead mines of Southeast Missouri; the zinc mines of the Joplin District of Missouri; and the copper deposits of the Lake Superior District, etc.

*Massive Deposits:* In these deposits the ore occurs in large masses, either as an original constituent of eruptive or plutonic rocks, or as replacement of portions of the original mineral constituents by the ore minerals, the after-mineralization being due to the cracking or fracturing of the mass, or a portion of it, and the introduction of mineralizing solutions.

The Sudbury nickel mines represent deposits of this class, as do also the so-called low-grade "porphyry copper" mines, such as the Utah Copper, the Nevada Consolidated Copper, the Ray Consolidated Copper, the Chino Copper Company, and the Chile Copper Company of Chuquicamata, Chile. In all of these mines, except those at Sudbury, the commercial values are due to secondary enrichment in the zone between the primary sulphide and the greatly leached capping, the richer values in this zone being due to the copper having been leached out of the ore near the surface by surface waters and redeposited below.

*Vein Mines:* In its simplest form, this class of mine represents a fracture in the earth's crust which has been filled by minerals deposited from gaseous emanations or heated solutions of deep-seated origin, from solutions descending from the surface.

The fracture may be a simple crack or opening, or a series of them, or, in passing through brittle formations may consist of innumerable small cracks. The solutions may, in one formation, have dissolved the rocks for a considerable distance from the main fracture and have replaced such dissolved rocks by other minerals. In less soluble formations there may have been practically no replacement, so that the same vein, while passing through different formations may pinch or widen, and even in the same formation there may be wide or narrow sections of ore, or of barren vein filling.

While such veins, or zones of fracture, may be followed for



great distances, even miles in some cases, it by no means follows that commercial ore is carried in them for such lengths or for great depths. In fact, in most veins there are so-called "pay streaks," which alone are capable of being mined at a profit, and upon the volume and grade of the ore in such "pay streaks" the value of the vein or ore deposit depends.

Many high grade gold veins are of a more or less capricious nature, with liability that the values will suddenly disappear, "bottom," or "peter out."

### **Topography**

For geological reasons certain of the minerals, if not all, have been found in mountainous regions, for they have been formed in or by veins which represent fractures in the earth's crust, which occurred during periods of great dynamic disturbances coincident with the elevation of the mountain ranges. This applies particularly to such minerals as are the result of deposition from hot solutions or gaseous emanations from great depths. Gold, platinum, silver, tin, copper, lead, zinc, iron, and many others are represented by this phase.

Iron ores, lead and zinc ores, are also found in districts of minimum disturbance, in flat-lying strata. Secondary iron ore in a concentrated form resulting from the leaching of iron-minerals and their redeposition in more or less undisturbed sedimentaries is also common. Roughly speaking, however, the home of the precious and base metals is in mountainous regions.

Coal, lignite, bog iron ores, nitrates, and sulphur may or may not occur in mountainous regions, but their mode of formation—they being in a sedimentary form—did not require great dynamic changes of the earth's crust, as represented by mountains.

### **Geography**

The greater part of our gold, platinum, and silver comes from the mountainous states of the West, such as Arizona, Idaho, New Mexico, Colorado, California, South Dakota, Nevada, Montana, and Utah.

Our principal copper deposits are in Arizona, Montana, Utah, Michigan, New Mexico and Nevada, and, to a lesser extent, California and Colorado. The most important lead states are Missouri, Idaho, Utah, Oklahoma, Colorado, Wisconsin, and Nevada. Zinc is found principally in Missouri, Oklahoma, Kansas, Wisconsin, Colorado, Utah, New Mexico, Montana, Idaho, and New Jersey.

The major part of the metallic nickel produced in this country comes from ores mined in Ontario, Canada; the production of nickel from our own ores being negligible. Practically all of the aluminum produced in the United States comes from ores mined at Bauxite, Kansas, the place taking its name from the principal aluminum mineral. Other bauxite ores are found in the States of Georgia and Alabama, but none of these latter ores are used in the manufacture of the metal aluminum. Some aluminum products are produced from other minerals of aluminum found in other localities, but bauxite is the most important aluminum ore. Quicksilver, or mercury, is produced mainly in the States of California and Texas.

This will give an idea of the causes and locations of our sources of metal supply. We will now take up a brief study of their development.



## CHAPTER III

### PROSPECTING AND DEVELOPMENT

#### **Prospecting and Prospectors**

New mines or new districts have been many times discovered by accident, as was the case of the Murray Mine in the Sudbury District of Canada, when nickel ore was uncovered in the construction work of the Canadian Pacific Railway, and of the gold mines of the Transvaal in South Africa.

Further large discoveries have been made by prospectors, men of adventurous spirit and in whom the gambler's instinct was very strong. These men in the main were unscientific and uneducated, though they were pioneers of great perseverance and fortitude. Most of them were "grubstaked" by others, that is to say they were supplied with a camp outfit, with food, and with the necessary supplies by someone else, and if anything of value was discovered the prospector divided with the party or parties grubstaking him. Many of these men were good miners, and many of them worked simply for a day's pay in operating mines during the winter, but at the first approach of spring became restless and uneasy and anxious to start out in their search for quickly made fortunes.

#### **Mining "Stampedes"**

There were stampedes in '49 to California, men traveling across the plains under primitive conditions and exposed to dangers due to lack of water, attacks by Indians, etc., and many going via the fever-infested Panama route. The Klondike in '98 affords an illustration of a mad rush for gold which resulted in the death of many who were unprepared for the rigors of a semi-Arctic winter and the terrible difficulties encountered in attempting to cross the famous snow-covered Chilcoot Pass to reach the Yukon. There were stampedes to Australia to the

gold diggings discovered in the early '50's, and on a small scale there have been stampedes at various times in the different states of this country, where on the spur of the moment, or on account of a single tale of rich discoveries whole communities would move out to stake out ground in the hope that on the strength of the rumor they might find something of value.

### **Changes in "Prospecting"**

The mining prospector—a very numerous class many years ago—seems to be dying out and there are very few of them left; not so much because nothing remains to be discovered as because of the fact that in recent years it has been possible for men of a speculative spirit to take their "fliers" by investing in securities of large well-organized companies whose mines have or have had considerable speculative value rather than in small uncertain ventures. Early mining speculation was rather in small undeveloped properties requiring small capital and operated commonly by men of no particular skill or experience. These operations, while containing the speculative chances, were not based on the solid foundations of the well-organized companies.

During the last twenty years the large copper companies particularly have provided an outlet for the more or less speculative investor. Large mining organizations have searched for a few big things rather than for numerous small ones, so that there has not been the opportunity for the prospector to sell or dispose of his small findings to the extent that was formerly the case. Therefore, the chances for success, so far as the prospector is concerned, have not been as great as formerly, nor have the rewards been sufficient to tempt new blood to join the ranks of the rapidly disappearing old-time searcher for ore.

In the case of the "porphyry copper", the opening up of such properties was not due to the discovery of new mines or new ore, but to the experience and faith of certain capitalists and their engineers in the possibility of working low-grade ores on a large scale at a profit, which under previous conditions had been unprofitable. In many cases the properties had been

abandoned. The prospecting and development of such properties was almost revolutionary in character, and, as far as the old-time prospector was concerned, was as drastic as was the introduction of machinery in the weaving and other industries where hand labor has been supplanted by the machine.

## **The Future**

Sooner or later it will be necessary to revert to the old methods of picking up small partially developed properties, because of the fact that in the main the properties of great size have been combed over, and the large mining organizations, unless such are allowed to die, will be forced to look to the acquisition of numerous small properties rather than a few large ones.

The depletion in the ranks of prospectors has been watched with considerable alarm by those interested in mining, and much discussion has resulted as to ways and means of rejuvenating this branch of the mining business, but so far without success.

## **Systematic Prospecting and Development**

What we call "prospecting" now refers more to determining the extent of known deposits, rather than to seeking new ones. Prospecting and development, as carried on systematically today, so merge into each other that the operations are hard to separate. What starts out as prospecting rapidly becomes development; and the latter, instead of simply opening up known ore-bodies ready for extraction, takes on the nature of prospecting, or searching for more ore-bodies, or determining the limits of a partially known body. This is done by drilling, either with diamond or churn drills in the case of ore-bodies which extend, and running drifts in the case of ore-bodies fairly narrow and of no great horizontal extension, in order to determine the extent and average assay value of the ore. Such campaigns often cost hundreds of thousands of dollars, but they frequently multiply greatly the known tonnage and value of the ore bodies.

Prospecting by diamond drill or churn drill has been particularly useful in the case of the iron mines of the Lake Superior

district, and the co-called "low grade copper porphyries" of our western states; also for coal, and for determining the extent and average value per cubic yard of gold placers for dredging and hydraulicking.

In the case of some of the very large mines, such as that of the Braden Copper Company, in Chile, prospecting and development of the ore-bodies has practically all been done by underground drifting and raising. To a great extent, this has also been the case as regards the Lake Superior copper mines; the mines in the Couer d'Alene District; and those at Butte, though diamond drilling has been employed to some extent in the latter.

Such thorough prospecting by drilling has not only located more ore, but has eliminated in advance practically all uncertainty as to quantity and grade, and has also made it possible almost at the start to make plans for installing plants of sufficient capacity to extract and treat the ore at the greatest financial advantage to the owners.

Also, it has proved or developed ore sufficient to last for twenty, thirty, fifty, or even a hundred years, and the knowledge of the quantity and grade of the ore has made it possible to finally place such operations in the industrial category, though until the tonnage, value, and method of treatment were proved, such properties had a highly speculative tinge.

With ordinary vein mines, the determination of the ultimate tonnage by extensive development is much more difficult and is often unwarranted by the added expense. For instance, in the case of a vein mine in which the walls or the vein itself are made up of more or less soft and yielding material, perhaps necessitating heavy timbering, it is often inadvisable to open up ore more than a year or two ahead of the requirements, because of the difficulty and cost of keeping the necessary drifts and raises open during such prospecting and development. At Butte, Montana, a thorough development of the properties would be inadvisable; and this also applies to some of the ore-bodies at Bisbee, Arizona.



## CHAPTER IV

### OPERATIONS

#### **Mining Operations**

The ordinary conception of a mine is a hole in the ground, from the bottom of which tunnels are driven in different directions and through which the ore is extracted. Real mining is much more complex.

The simplest of all is mining by open-cut, or quarrying. Many mines have been started in this way, but later, in order to protect the workmen from falling or caving ground, underground operations have been found necessary. This is sometimes done by driving an adit (passage) in a hillside to reach the vein or deposit, and from this, driving drifts through which the ore can be taken out, usually by means of cars. If the vein has a steep dip, there are a number of these drifts spaced at distances of fifty to one hundred feet or more apart, and the ore is extracted by stoping between them, either leaving pillars to keep the ground from caving, supporting the ground by timbering during the extraction of the ore, or filling the open spaces left with waste rock, in order to support the roof.

If the ore cannot be attacked by tunnels or adits, shafts have to be sunk. In the beginning these are operated by man power; later, perhaps by horsepower, and still later by gasoline, steam or electric power. Such shafts are often most elaborate and the hoisting is done by very large and costly machinery, with massive headgears and hoisting engines, and with large ore bins and extensive railway tracks as attendant features.

#### **Use of Steam Shovels**

One of the cheap methods, where it is possible to do so consists in extracting the ore by means of steam shovels. This requires ore bodies of considerable width, length and thickness,

necessitating the removal of comparatively small amounts of capping or overburden, as compared with the ore to be mined. Important mines operated by the steam shovel method are the Utah Copper Company, Chile Copper Company, Nevada Consolidated Copper Company, and the Iron Mines of the Mesaba Range.

Copper ores of similar nature to those above mentioned are mined by underground methods at the Inspiration Copper Company, Ray Consolidated Copper Company, and Miami Copper Company. Both methods are employed at the mines of the Nevada Consolidated Copper Company, it being found that at one of their mines the steam shovel method admits of lower cost, while at the other, underground methods have proven cheaper, the reason being that at the second mine the proportion of overburden necessary to be removed if steam shovel operations were carried on is very much greater than in the case of the other.

Gold and platinum placers are mined by sluicing, hydraulicking or dredging. Such is also the case with residual tin deposits.

## **Management**

As in any business, great care must be taken in the organization and management of a mining property. It is often said that a good mine may succeed under any management, good or bad, but all success is relative. While under poor management, profits may be made, they will not be commensurate with what they should be.

By "management" we usually mean the conduct of operations on the spot. But this should not be all, for, even with the best local management, direction by the home office or directorate may be such as to make the efforts of the local management inadequate, such faulty direction being in the line of improper policy as to finances, as to authorization for proper processes, proper machinery, or for the employment of adequate forces and proper personnel.

## **Ore Treatment**

The consideration of the treatment of ore mined is of the greatest importance and upon it depends the success or

failure of the enterprise. The simplest proposition of all is one where the ore is in such a state as to be marketable immediately without further treatment. Such is the case with high grade iron ores, which simply require the delivery of the ore on to cars and transport to blast furnaces owned by the company which mines the ore, or by companies which purchase the ores at the mine or at Lake ports.

Many ores require treatment more or less elaborate, such as (1) concentration; (2) cyaniding; (3) leaching; (4) amalgamation; and (5) smelting direct, or with other ores or fluxes.

(1) *Concentration*: The simplest phase of concentration is that practiced in the case of gold, or tin occurring in placers, and is carried on by simply throwing the gold bearing gravel or tin gravels into sluices, the lighter material being washed away, leaving the gold or tin in the bottom to be gathered up and still further concentrated by further washing in smaller bulk. Such concentration is also carried on in hydraulicking, where gravel banks are washed away by means of water under high pressure and carried into sluices, the gold again settling to the bottom or being caught in riffles. In the case of dredging, the material is dug by the machines and washed over plates and riffles, where the gold is caught.

More elaborate concentration requires the crushing of the ore to different degrees of fineness, and the gravity separation of the heavier particles in water by means of jigs and tables. For the recovery of copper in metallic and sulphide form, and of lead and zinc sulphides, wet concentration, supplemented by flotation is now in the main employed.

Of late years oil flotation, sometimes in conjunction with gravity separation, has been employed. This oil separation has marked a great advance in concentration, and has increased extraction in the case of copper and lead ores from 60% or 65% up to and over 90% in many cases. The concentrates resulting are smelted.

As a general rule only ores in which the valuable mineral is either in the native form, or in the form of sulphides, can be concentrated. Oxidized ores, except tin ore, are difficult if not impossible to concentrate commercially.

(2) *Cyaniding*: Better extractions are often obtained, especially on gold and silver ores by dissolving the gold and silver in cyanide solutions and precipitating the precious metals in metallic form.

(3) *Leaching*: Except in the case of cyaniding or chlorinating gold or silver ores, practically no leaching has been done on the metallic ores. But, in the last few years large operations have been conducted in which the recovery has been dependent on leaching methods, and as an instance of these may be mentioned the leaching plants of the Chile Copper Company at Chuquicamata, Chile, and the New Cornelia Copper Company at Ajo, Arizona. At these plants copper is leached by sulphuric acid and precipitated by electrolysis, or as metallic copper on iron.

In the case of zinc, the Anaconda Copper Company and others are using leaching methods, with precipitation of the zinc by electrolysis, and these methods promise great expansion.

(4) *Amalgamation*: For the treatment of metallic gold occurring in veins, the amalgamation method has been in the past the principal one used. In this treatment the gold is crushed to 20-mesh or finer and is caught by quicksilver either in the batteries or on amalgamated plates outside, or often by a combination of the two methods. In the old days much silver was also saved by means of quicksilver. At the present time, however, cyanide has largely replaced amalgamation for silver ores.

(5) *Smelting*: Many copper and lead ores are treated direct by smelting, especially carbonate and sulphate of lead and oxidized forms of copper, particularly where the latter are high grade or are accompanied by silica, oxide of iron or lime, necessary for fluxes in the treatment by the smelting company of other ores. Concentrates of both copper and lead are also smelted, and concentrates of zinc blended ores have special smelting treatment. The different smelting processes will not, however, be gone into here. They have to be considered, however, in laying out the plans for the ultimate disposal of the mine product.

Smelting operations for the treatment of copper, lead, and zinc ores, are usually carried out in customs smelters, where it is possible to combine ores of different character and associated

with different fluxes. It is not often possible to smelt any one ore alone without the addition of fluxes, but using ores associated with different fluxes makes one help the other. In the case of lead and copper, it is often necessary to refine the resulting metal produced by the blast furnaces at custom refineries. Some mining companies own and operate their own smelting plants. This is true in the case of the Nevada Consolidated Copper Company; the Copper Queen Mining Company; the Greene-Cananea Mining Company; and the Granby Mining, Smelting & Refining Company, the blister copper produced being sent to eastern refineries. The Anaconda Copper Company smelts and refines its own copper, as does also the Calumet & Hecla Mining Company.

Lead and zinc ores are usually sold to custom smelters, though there are some mining companies which combine smelting and mining.



## CHAPTER V

### THE VALUE OF A MINE

Having attained some insight into the development and operation of our mining properties we are now ready to consider some of the factors which must be studied carefully to reach a sound basis as to the worth of a mining property:

#### **Geographic Position**

The geographic position, on which depends the transportation, distance from market, from source of supplies, etc., is one of great importance.

In the case of gold, the question of the transportation of the gold bullion, except as regards safety, is of small moment, as for this the crudest methods may be employed, such as pack animals, etc. The main question is the delivery of supplies and materials necessary to carry on operations.

If the ore is copper, lead, or zinc, easy and cheap transportation to market is absolutely essential. What might be a good ore, with a market easily accessible and with good railway transportation, would be absolutely useless in inaccessible districts, so that, other things being equal, a property may be valuable if situated in one district and absolutely worthless if situated in another.

For example, there are iron ore deposits in Utah, California, and Washington, which have at present little or no commercial value due to the fact that they are situated far from markets and from proper fuel. These same deposits, if situated in Ohio, Pennsylvania, or New York, would be quickly snapped up and operated. A body of lead ore if situated in the mountains of Bolivia might be worthless, whereas the same deposit in Missouri, Illinois, or Pennsylvania, would be of great worth.



## **Ore Reserves**

The first question of importance in connection with a mining proposition is the amount of ore developed, "probable," the future possibilities, and the grade and value of the ore.

While the ore blocked out and "probable" is of the utmost importance in determining the worth of a mining investment, it is also desirable to know if, in the opinion of the engineer, there are favorable though not fully proven possibilities for increased tonnage, for such would add to the prospective or strictly speculative value of the stock. Such an opinion should give reasons for expectation, but should give no definite tonnage.

The sizing up of possibilities is most difficult, and to be of value should be based on the views of a mining engineer of proven experience, judgment, and reputation.

## **Developed Ore**

By ore blocked out or developed, we mean ore exposed on four sides by drilling, surface exposures, or underground development. The exposures should be sufficiently close together to make the ore within their limits seem continuous and practically certain.

## **"Probable" Ore**

By "probable" ore we mean such sections of the ore-body as have been partially determined by drilling or underground development, but which, with this partial testing, together with a study of the geological and physical conditions, enables one to feel reasonably sure of the ore tonnage estimated.

## **Costs and Profits**

At what cost the ore can be mined and treated must be determined, and whether or not the profit estimated would be a satisfactory one. It is also necessary to satisfy one's self as to what can be expected in the way of percentage of extraction by the proposed metallurgical process, and if sufficient tests have been made to prove that the proposed process may be counted upon to be successful and to be the cheapest one under the conditions.

Quoting W. R. Ingalls:

The more quickly the values of a mine can be realized, the larger will be the net profit.

When money is invested in the purchase of a mine, it has got to earn a dividend commensurate with the risk, and it also must be refunded, else there is no profit. The more quickly the principal can be refunded the greater will be the profit, because ten millions in value that can be realized in ten years is worth more as a purchase than ten millions that can be realized in forty years.

Amortization of the principal is therefore a very important consideration.

### **“Present Value” or “Actuarial Value”**

Occasionally in brokers' prospectuses or circulars, and sometimes in engineers' reports, the term “present value” or “actuarial value” is used. The working out of these values for mines was probably first applied at the Rand in South Africa, and later, in many instances, for the low-grade coppers.

The “present value” of a share of stock represents the sum which an investor may pay for it, under certain assumptions of ore reserves, annual output, costs, metal prices, annual profits, and life of property, to obtain a certain rate of interest on the investment, and through reinvestment of a portion of the annual income, the return of the original investment at the end of the life of the mine.

For example: If we take an operating mining property having ore reserves amounting to 45,000,000 tons, a plant capacity of 3,000,000 tons per year and a life, therefore, of fifteen years, an estimated profit per ton of \$2.00 based on normal metal prices, and a capital of, say, 1,000,000 shares, no par value, the annual operating profit would be \$6,000,000 or \$6.00 per share, and this would continue for fifteen years. The “present value” of \$6.00 per year for fifteen years on, say, an 8% income basis would be \$47.47; \$3.79 per year would represent interest at 8% on \$47.47, and the remaining \$2.21 if reinvested each year at 5% would amount to \$47.47 at the end of fifteen years.

The “present value” of the share on the basis assumed is only \$47.47, although the total profits per share over the fifteen years' life amount to \$90.

Very often this question of "actuarial value" is lost sight of, but it is a very important one. With mines of very long life it is not so important as with those having a shorter life, as the shorter the life of a property the greater the portion of the profits which must, or should, be set aside to retire the investment at the end of the life.

As a corollary to this, the shorter the life of a property, assuming plant built and paid for, the greater the "present value" of gross profits.

Herbert Hoover states:

Money locked up in ore underground is idle money, and the profits from mining can be increased in no mean degree by rendering it liquid.

### **Improved Methods**

An argument often presented in favor of a mining proposition is, that while a certain property had previously been unsuccessfully operated, and therefore closed down, because the then known methods of treatment had not given a sufficiently high extraction or at a sufficiently low cost to give a profit, with some newly invented process, or one so improved as to work satisfactorily, great profits can be expected. Great care should be exercised in investing on such a basis, though many of the most successful ventures have been the result of the belief that new methods or new processes would prove of value where old ones had failed.

As an illustration of this may be cited the first low grade porphyry copper properties, which depended entirely upon large production and improved methods of concentration for success. The faith in the feasibility of these improved methods was the factor that brought the great Utah Copper Mine into existence, followed by others in which there was less risk because of the pioneer work done by the Utah Copper Company. Another case was that of the Chile Copper Company, at Chuquicamata, Chile, the success of which depended entirely on working large tonnages of low grade ore and extracting the copper by a leaching process. The leaching of copper ores previously had not been of any real commercial success.

Oil flotation has so improved concentration of certain copper, lead, and zinc ores as to make it possible to work mines which otherwise would have been failures.

### **Inadequate Capital**

Many propositions have been unsuccessful because of inadequate capital, making it impossible to install a proper plant, or, if such a plant was installed, to carry on operations until such a time as sufficient returns could be received to pay the current bills.

### **Management**

It goes without saying that an efficient management is necessary for success. Even the best management, however, cannot make a poor mine pay; but on the other hand a poor management may ruin a good mine.

Those in local charge must be honest, industrious, intelligent, and able, and with initiative and a sense of responsibility. They must know how to handle men and how to instill loyalty into their organization, and keep up with the advances and improvements made in their lines. A good manager should have the faculty of choosing a good organization, and he should have a commercial and technical knowledge of business in general.

### **Directorate**

The directorate should be made up of men of energy and of high standing and business ability. They should be able to give the business the attention it demands, and should not be interested in a business of a competing nature. While it may be wise to have a few directors who are the salaried heads of departments, the majority of the directors should be men who truly represent the mass of the stockholders, rather than a few of the dominating officials, whose holdings are small and who perhaps wish to hold control on account of the prestige it may give them. Conditions are such that few men who depend on the salary a position gives them feel free to oppose the official who has the appointing and discharging power, and so may not be

able to look after the stockholders' interests fully. We do not mean to say that a dishonest course would not be opposed, but one of policy solely might lack the necessary opposition of the salaried director.

## **Market Conditions**

A most important question demanding great consideration is that of the market price of the predominant metal and the demand for it by the trade.

In general, prices of metals, as of other commodities, are subject to the law of supply and demand, and in the case of most metals supply and demand are in no way regulated, but, as will be seen from the following, regulation of the supply is often carried out either by mutual agreement by the principal producing company or companies, such regulation resulting in keeping the market from being flooded and in consequence preventing prices being slashed.

## **Control of Prices**

Control of supply, and in consequence, to a greater or lesser extent, of prices of the following minerals and metals, is regulated by agreement:

*Precious Stones in General:* Unless the diamond industry was controlled, as it is, by a few strong companies working in accord, the market would be flooded and prices of diamonds would drop out of sight.

*Copper:* The price of this metal is controlled to a very limited degree by producing companies voluntarily cutting down production when it is seen that stocks are getting too large.

*Nickel and Aluminum:* There is some regulation of nickel and aluminum through agreement with foreign producers, or to some extent by the large individual producers on this side of the Atlantic.

*Lead and Zinc:* There is practically no control of prices by the lead and zinc industries.

Among the base metals the course of zinc during the great European War illustrates this point, for after the war began the demand for zinc increased and prices skyrocketed, resulting in the starting up of new mines, building of new smelting plants, and the rehabilitation of old ones. This increased production to a point that caused the supply to greatly outstrip the demand, so that prices fell and many mines and plants had to shut down.

### Prices and Statistics

In the case of silver, copper, lead, and zinc, it is necessary to examine statistics of prices in the past, to see what the fluctuations have been, and also to consider the probable consumption in the future, and the probable average prices which will prevail for the metal over a series of years.

*Silver:* Before this century came in, silver had been as high as \$1.29 per ounce, and fell to under 50 cents an ounce. For the ten years prior to 1914 it averaged 58.69 cents per ounce. During the war it jumped tremendously in price, but conditions were abnormal and it is not necessary to consider them under the present circumstances. However, it is believed that it would be unsafe to go into a mining proposition now on a basis of a price for silver of over 60 cents an ounce.

*Copper:* The production of copper in the last twenty years has gradually increased. Between the years 1900 and 1910 supply and demand were close together, resulting in fair prices. With the bringing in of new low grade copper properties, with the increased production from others, and increased smelter and refinery capacity, production of this metal for some years to come could well be in excess of the demand. Luckily for the Allies during the war, it was possible to call on this increased capacity. For the ten-year period ending January 1, 1914, the average price was 15.11 cents a pound. Owing to increased wages and increased cost of supplies, which we do not believe will come down to pre-war prices in the near future, an average price of 16 cents to 17 cents a pound seems reasonable to assume for copper in estimating for the future, over a period of, say, ten



years. There will, however, probably be short periods when it will go much below 16 cents and much above 17 cents.

In the case of copper, there is no danger of imports from foreign countries affecting seriously our own prices, for the reason that a large proportion of the copper produced in the United States is exported.

*Lead:* As regards lead, the situation is somewhat different. New lead mines have not been or are not being found in sufficient number to keep up with the natural increased needs, and unless new properties are discovered there may be insufficient supply to take care of demand, resulting in higher prices. A price lower than the average of 4.63 cents per pound for the ten years preceding the war cannot be expected. It is believed that for purposes of estimating values in the future, it would be reasonable to figure on, say, 4.75 cents a pound.

It might be mentioned that the price of lead is dependent on the production of the metal abroad and importation into this country.

Many silver ores are associated with lead, and one or the other has been considered a by-product, but in view of low prices of silver, many silver mines which were operated under more advantageous conditions could not be worked, so not only was the production of silver eliminated in such mines but also the production of lead.

*Zinc:* Zinc is on an entirely different footing from any of the other metals. There are many mines to draw from. Such properties could be put into operation at low cost and in a short time, and new zinc plants could be quickly built and at a small outlay. In addition, with oil flotation, zinc ores can now be treated at a profit which were previously considered too complex, and this makes available a larger tonnage of ore.

The leaching and electrolytic precipitation of zinc will make possible the utilization of other ores which were previously deemed non-commercial. A safe price in estimating average future values for zinc metal would be, say, 5½ cents a pound. The average price for the ten years ending January 1, 1914, was



5.67 cents. The price of zinc is also regulated to some extent by importation from foreign countries.

*Iron:* Just what would be considered a fair price to fix for iron and steel, or iron ore, depends on too many considerations to be able to make any statement concerning it.

*Nickel:* No price can readily be placed on nickel, for we have no nickel mines in this country. The production is controlled by a few large companies having mines outside of the United States, and it has been necessary to work up demands and uses for the metal in order to obtain a market for the increased production. Published quotations are not considered reliable, for by far the larger proportion of the nickel production is sold by contract.

*Aluminum:* Aluminum is principally controlled in the United States by one large group, which is the miner, the producer of the ingot metal, and, with its subsidiaries, the manufacturer of the finished articles. The price of the metal, however, is to some extent affected by importation from the countries of Europe. The uses for aluminum have increased by leaps and bounds in the first twenty years of this century, and this has been entirely due to the wonderful work of the principal company in increasing the uses and demands for this metal.

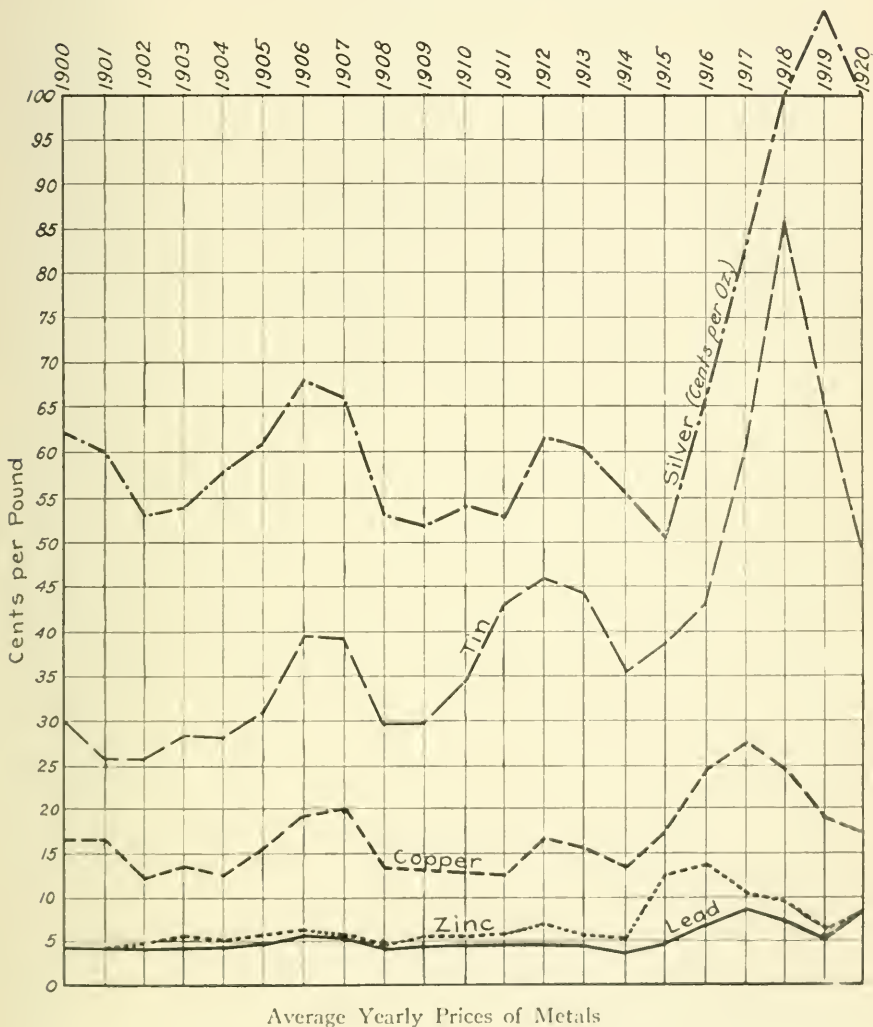
*Quicksilver:* The price for this metal is more or less dependent on prices in Europe, fixed in the main by the Rothschilds, who control the sale of the product from the mines of the New Almaden Quicksilver Company of Spain.

*Tin:* Tin is imported and prices are dependent upon foreign quotations.

In the case of aluminum and nickel, prices in twenty years have advanced quite uniformly, but in that of silver, copper, lead, and zinc there have been considerable variations due to general market conditions.

## Trend of Metal Prices

The following chart shows the trend of the average prices of certain more important metals over a period of years:



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## CHAPTER VI

### MINING PROSPECTUSES

#### Prospectuses

After a mining company has been formed, or when it is about to be formed, and when money is to be raised by offering stocks or bonds of the company to the public, the usual method of procedure is for the owners or promoters to arrange with a banking and brokerage house to underwrite a certain amount of the stock or bonds, and through such a firm or firms the securities are offered to the public.

In order to interest the prospective investor, the broker or banker prepares what is generally known as a prospectus, which is printed and distributed to the public.

#### What the Prospectus Should Show

A good prospectus should, briefly, give information relative to the following points:

- (a) Capital of the company; number of shares authorized; number of shares issued or to be issued immediately; amount of bonds to be issued, if any; and debts of company, if any.
- (b) Purposes of the sale of stock or bonds, and the use to which the proceeds will be put.
- (c) Location of the property; extent of property; accessibility, etc.
- (d) Copies of engineers' reports, or a brief summary of engineers' reports, giving:—
  - (1) Estimated ore reserves, tons, and average assay.
  - (2) An opinion as to the future possibilities.
  - (3) An estimate of operating costs and profits per ton of average ore, and in the case of base metals, cost per pound of metal, recovered.

- (4) Estimated percentage recovery of the metals in the ore.
- (5) Statement as to capacity of plant then in existence.
- (6) Recommendations as to capacity and type of plant to be installed.
- (7) Estimate of annual operating profits and estimate of when it may be expected that these operating profits will start.
- (8) Estimate of length of time it will take to complete the plant and start operations.

### **What the Investor Should Determine**

The prospective investor should, by analyzing the figures given on costs and profits, determine the following:

- (a) The basis on which he is buying into the property, namely, the total authorized number of shares issued or to be issued multiplied by the price which he is being asked per share.
- (b) The average annual operating profit, as estimated by the engineers, less the interest which would have to be paid on outstanding bonds or other debts, from which the annual profit per share could be figured.
- (c) The probable life of the property, which would be the estimated tonnage of ore reserves divided by the estimated annual plant capacity.

The above figures would indicate to him that the property would earn certain net amount per share per annum for a certain number of years, from which he could judge whether or not the investment would be a desirable one.

In addition he should carefully note what is said regarding future possibilities, which would indicate whether or not the value of the property might be greatly increased by further development. He should bear in mind the fact that it is usually not possible for a company to pay out in dividends its total operating profits during the first few years of operations, for the reason that it is nearly always necessary to accumulate working capital to take care of further mine development, plant extensions, and of metals in process and in transit to markets.

It may be mentioned in the case of copper ore, concentrates or blister copper produced in the West, that ninety to one hundred and twenty days is required between the time of shipping to the smelter or refiner and the time of delivery of the refined copper.

### A "High Grade" Prospectus

There are various kinds and types of prospectuses distributed. Many of them do not give sufficient information to enable the investor to judge for himself, as they are often simply glittering generalities, holding out high hopes but giving no definite information on which to base these hopes. While occasionally such prospectuses have to do with properties which eventually turn out well, yet the great majority of them do not.

An illustration of the best type of prospectus is that which was issued by the General Development Company in March, 1908, on the Miami Copper Company, the text of which is quoted below in full:

#### PROSPECTUS

This Company is the owner of mining claims acquired from the General Development Company as Vendor.

The properties consist of a group of claims containing approximately 200 acres of mineral lands on which the General Development Company has expended large sums of money in developing and proving the value of the ground.

Reference is made for a description of the property, character of the ore deposits and the probable cost of production, to the following report of J. Parke Channing, Engineer, the eminent authority on copper properties:

NEW YORK, March 12, 1908.

Adolph Lewisohn, Esq.,  
President, Miami Copper Co.,  
42 Broadway,  
New York City.

Dear Sir:

The property of the Miami Copper Company consists of about 300 acres, 200 of which is mineral land, located six miles west of the city of Globe, Arizona, at which city are the mines and works of the well-known Old Dominion Company.

Development which is still being carried on shows to date 2,000,000 tons

of concentrating ore containing 3% of copper. Ore was struck at a depth of 220 feet and the bottom of the shaft, a depth of 500 feet, is still in ore, and the area shown of the ore-body is 300 feet by 350 feet, without having as yet reached the limits, so that the prospects are that an enormous body of concentrating ore will be developed as indicated by surface conditions.

The Gila Valley, Globe & Northern Railway ends at Globe, six miles distant, and surveys past the Miami have been made and right of way secured; this extension will pass within a quarter of a mile of the mine. There is abundant water available for concentration purposes.

It is proposed to erect the first unit of a reduction works, which unit will have a daily capacity of 1,000 tons. This will give an annual production of 14,000,000 lbs. of copper, based on 350 days running time and a yield from the 3 per cent ore of 2 per cent, or 40 lbs. of copper to the ton.

Concentrating tests have shown that the ore can be readily concentrated 10 into 1 and the resulting concentrate smelted with the above yield in fine copper. It is estimated that the cost of electrolytic copper sold in New York will be 9 cents per pound. On this basis the profits at 12 cent copper will be \$420,000 per annum, and at 15 cent copper \$840,000 per annum. As developments advance a second unit of 1,000 tons daily capacity will be built which will double the above figures of profit.

It is estimated that it will require \$750,000 to erect the necessary first unit of the reduction works and that \$250,000 additional will be required for mine plant, shops, buildings, etc.

The ore deposit of the Miami Copper Company is in nature similar to those of the Arizona Copper Company, the Nevada Consolidated Copper Company, the Utah Copper Company, and the Boston Consolidated Mining Company; that is, large masses of ore in which the copper as a sulphide mineral is disseminated through the rock and which readily yields a high grade concentrate by water treatment, which can be easily smelted.

The mining is simple and cheap and when found these deposits are the most valuable as copper producers. The Miami ore running 3 per cent in copper, as it does, is higher in grade than any of the above mentioned properties and it will without doubt prove a large producer and dividend payer.

Yours truly,

(Signed) J. PARKE CHANNING,  
Consulting Engineer.

As the entire outstanding capital of the Company (including the proceeds of the 200,000 treasury shares that are now being issued) amounts to only \$2,500,000, it will be apparent that the prospects are bright for large returns.

The Company has in its treasury 300,000 shares of the par value of \$5 each. The balance of its share capital was issued to the General Development Company as Vendor, in payment for the properties upon which the latter had expended large sums of money in acquiring and exploiting the claims. The various contracts between the original owners of the claims of the General Development Company, and others from whom they were purchased, showing



the original cost of the various properties together with statements of the amounts paid therefor by the General Development Company, the moneys expended by it in exploiting and developing the properties and everything appertaining to their cost will be filed at the office of the National Copper Bank, open for public inspection.

It is intended to inaugurate a radical departure from previous methods in the issue of properties of this character, with a view to inviting public confidence by fully exposing the original cost and all profits connected with the flotation of the Company.

For the purpose of providing the necessary funds for the erection of reduction works with a capacity for treating 1,000 tons of ore per day, and for the proper equipment of the properties for further development, and the installation of machinery.

200,000 shares of the treasury stock are now offered for subscription at par, payable as follows:

\$2.00 per share to accompany the application for subscription; and the balance of

\$3.00 per share payable within 10 days after notice of final allotment.

If less than the number of shares applied for is allotted, the sum paid on subscription will be credited on the number of shares allotted. On failure to make the final payment, the amount paid on subscription will be forfeited.

Applications for subscriptions should be made to the National Copper Bank. All checks should be made payable to the order of the National Copper Bank, and mailed with the application to its office at No. 115 Broadway, New York City.

The subscription list will be opened on April 6, 1908, and will be closed on the following day. The Company reserves the right, however, to close the subscription list at any time without notice; to reject any subscription and to allot any smaller amounts than applied for.

All proceedings connected with the organization of the Company and the issue of its stock have been taken under the supervision of Messrs. Guggenheimer, Untermyer & Marshall, the Counsel for the Company.

The expenses of the public issue other than the underwriting charges are borne by the General Development Company, so that the entire proceeds of this issue after deducting the underwriting commission, will be available as working capital in the treasury of the Miami Copper Company.

THE ENTIRE ISSUE OF STOCK NOW BEING OFFERED HAS BEEN FULLY UNDERWRITTEN BY RESPONSIBLE PARTIES, UNDER AN AGREEMENT THAT IS LODGED WITH THE BANKERS AND IS OPEN TO INSPECTION. BY THIS AGREEMENT THE UNDERWRITERS ARE BOUND TO TAKE ALL THE STOCK NOT SUBSCRIBED BY THE PUBLIC.

GENERAL DEVELOPMENT COMPANY  
MIAMI COPPER COMPANY.

Dated, New York City, March 28th, 1908.



## **Prospectus Analyzed**

An analysis of the above prospectus would bring out the following important points:

Total authorized capital: 600,000 shares, \$5.00 par.  
Ore Reserves: 2,000,000 tons, averaging 3% copper.  
Possibilities of additions to reserves: Excellent.  
Capacity of Plant to be installed: 1,000 tons per day, or 350,000 tons per year.  
Estimated annual production of copper: 14,000,000 lbs.  
Estimated cost per lb. of copper produced: 9 cents.  
Estimated copper recovery per ton of ore: 40 lbs.  
Estimated annual profit with copper at 12 cents—\$420,000.  
Estimated annual profit with copper at 15 cents—\$840,000.  
Report was made by mining engineer of highest standing and of great reputation.

Judging from this prospectus, the worst the company would probably do would be to earn at the rate of 70 cents per share over a period of six years, but as 15 cents per pound seemed, at that time, to be a fair average price for copper, it would be reasonably safe to assume that the annual earnings, after operations started, would be at the rate of \$1.40 per share.

It should be noted that nothing was said in the prospectus as to how long it would take to build the concentrator and start earning. We would have to make an assumption, therefore, that it would take two years to build the plant, and, say, another year, to get up to full capacity.

The investor could then figure, based on developed ore alone, that he could expect to receive, after the first three years, a dividend of, say, \$1.40 per share for six years, bearing in mind that there were excellent possibilities beyond this.

Roughly he would have to take 80 cents out of each \$1.40 dividend to pay back his original investment. The balance of 60 cents would be interest, which would be, roughly, equivalent to an average of 8% over the total nine-year period.

Except for the fact that the prospectus indicated excellent chances of very much more ore being developed, this would not appear to be a very attractive return on a new mining investment. But, the prospectus is very conservative and holds

out hopes of very much greater profits to come and gives very good reasons for these hopes.

### **Actual Developments**

As a matter of interest, during the first year after the above prospectus was issued, the ore reserves were increased to over 13,000,000 tons, and it was decided to erect a plant having a capacity of 2,000 tons per day instead of 1,000 tons, and later on a further increase was made. During the six years, 1911 to 1916 inclusive, a total of 6,831,336 tons of ore were milled; 209,803,878 pounds of copper were produced, \$9,695,783.75 were paid in dividends, and about \$6,500,000 were accumulated in quick assets, making the total apparent operating profit for the six years about \$16,000,000.

The average price received per pound of copper sold was 17.67 cents, but even without this rather high price, or say if the average had been 15 cents, the profits would still have been high, and would have amounted to about \$10,400,000. This meant that the investor who paid \$5 per share for stock in 1908 would have received, even with copper at 15 cents per pound, a total of \$13 per share up to and including 1916, or an average of \$1.60 per share per year. In other words, he would have received 10% interest on his investment, or 50 cents per share per year, and in addition would have received \$8 returned capital.

At the end of 1916, there were still remaining in the mine 16,400,000 tons averaging 2.40%, and the mill had a capacity of 5,600 tons of ore per day, which would mean a life of over eight years, considering high grade ore only.

### **Poor "Prospectuses"**

As against prospectuses of the best class, there are numerous others published which are circulated with the idea of selling stock in companies for the purpose of profit to the promoter or promoters, regardless of the sound value of the mining property owned by such companies.

Usually a sensible study or analysis of such prospectuses will show that the untrustworthy or inexperienced betray themselves

in their every written statement. The real information given is either very meager or entirely lacking, and is very often based on hearsay evidence only, or on glittering reports of inexperienced men.

For instance, a prospectus might state that a company had a capital of \$5,000,000, in 5,000,000 shares of \$1 each; that the mine was situated in the high mountains of Ecuador; that there are ten million tons of ore "blocked out"; that two assays made by a well-known firm of assayers averaged ten per cent copper; that the copper could be produced for 4 cents a pound; and that, therefore, there would be a profit of \$20,000,000 in sight.

Such a prospectus on the face of it would indicate that the evidences are wholly incompetent, and that it is purely a gamble, probably based on the statements of people who have no idea of sound mining. At the same time such prospectuses, holding out as they do hopes of huge profits, mislead the unwary investor, who will buy the stock and eventually lose his money.



## CHAPTER VII

### ANNUAL REPORTS AND FINANCIAL STATEMENTS

#### Bases of Information

After a property has been operated for some years, there should be very much more information on which a prospective investor could base his judgment as to whether or not he wished to purchase shares of a company. His principal source of information would then be the annual reports made to the shareholders by the company, and many of the best mining companies issue very excellent ones, in which are included:

- (a) A general statement by the president, in which he covers briefly the results of the operations for the year, giving the total amount produced and the average cost per ton of ore or per pound of metal; the profits of the years, etc.; and in which he refers to the report of the consulting engineer or general manager, and to financial statements appended.
- (b) A report by the consulting engineer or general manager covering in greater detail the operations of the company for the year. This would tell of any further prospecting which had been done; of any additions to ore reserves; would give an up-to-date estimate of ore reserves; and would cover briefly the mining and treatment operations, giving average grade of ore mined; average recovery in the mill or smelter; and average cost for each of the main items, and total average cost per ton of ore or per pound of metal produced.
- (c) A set of financial statements, which has usually been submitted to and audited by a firm of public accountants. These statements would include:
  - 1. Statement of Assets and Liabilities.
  - 2. Profit and Loss Statement for the year.
  - 3. Statement of Undivided Profits.
  - 4. Statement of Current Assets and Liabilities.

Some companies, however, do not give much detailed information in annual reports, for the reason that they believe it is better policy not to do so. In such cases, the prospective purchaser would have no way of determining just what the value

of the stock might be, except to judge it entirely by the annual profits, which are usually given even in the most meager annual reports and statements.

Annual profits mean very little unless it is known how many years they may be expected to continue, and unless an investor can ascertain something about the ore reserves and about the life of the property, it would be unwise for him to invest except as an absolute gamble.

### A "Good Report" Illustrated

As a typical illustration of a good annual report, the following excerpts from the report of the Nevada Consolidated Copper Company for the year ending December 31, 1913, are given. A later year has not been taken for the reason that after 1913 the war made conditions such as to make both costs and profits abnormal.

*The President's Report to Stockholders:* This submits and comments on the report of the Consulting Engineer and the financial statements. Briefly, it calls attention to the following important points in connection with the year's operations:

The average cost of copper produced was 9.51 cents per pound of refined copper f. o. b. Atlantic seaboard, as against 8.33 cents for the preceding year. Good reasons are given in detail for this difference, such as grade of ore, increase in wages, betterments, etc.

The president states that a number of inquiries had been received from stockholders bearing on probable costs for 1914, and goes on to say that while it is difficult to forecast in advance, and that while it is not the policy of the directors to prophesy, still they believe that for various reasons, which he gives, 1914 cost per pound should approximate the 1913 figure.

Exploratory work during the year developed 3,269,000 tons averaging 1.42% copper in the Liberty pit area.

The tonnage of ore mined during the year amounted to 3,148,285 tons averaging 1.597% copper, leaving as reserves, as of December 31, 1913, 39,108,590 tons averaging 1.65% copper as compared with 38,853,551 tons December 31, 1912.

In commenting on the financial statement the report brings out one point which is particularly worthy of notice, and the following portion is believed worth while quoting verbatim:

During the year \$522,790.97 was charged against Undivided Profits for ore extinguishment, making a total of \$2,321,699.55 written off for ore extinguishment since the beginning of operations, and represents the original cost of the ores extracted. This charge against current profits is credited to the Property Account, which is correspondingly reduced. The profits shown are, therefore, profits in excess of the initial or first cost of the ore in the ground. We market the full product from these ores and consequently accumulate funds in excess of the Undivided Profits to the extent that we set aside this amortization fund. It is due to this method of handling the Profit and Loss Account that the extra dividends are charged against Surplus Account, instead of Undivided Profits, and it is for this reason that in sending to you checks for the extra dividends you have been advised it is a return of capital; in other words, in our operations to date there has been taken out of the mine ore which cost initially \$2,321,699.55, and of this amount \$1,999,457.00 has been returned to the stockholders in the shape of extra dividends, \$999,728.50 in 1912, and a similar amount in 1913. If the transaction was not handled in this manner the true earnings would be overstated and eventually when all the ore had been mined and the property had to be abandoned there would remain on the books an asset of the Property Account. To avoid this condition arising the property is being amortized and as cash accumulates from this amortization it is paid to the stockholders as a return of capital.

### **Extraordinary Expenditures**

The report goes on to state that during the year \$1,122,506.75 were expended in stripping overburden, of which \$584,184.78 was charged to operations, and the balance was carried as deferred charges against future operations. The total cost of stripping overburden from the beginning of operations to the end of 1913 amounted to \$5,337,271.52, of which \$2,060,874.28 has been absorbed in operating costs, and \$3,276,397.24 remained as a deferred charge to be distributed over ore tonnage as extracted in the future.

In explanation of this part of the report, it may be stated that in the case of many of the large copper mines, especially in steam shovel mines, it has been found necessary to expend large sums for stripping the ore-body in advance, and of this amount only that portion is charged directly to operations



which belongs to the ore extracted. In the cases of these large mines there will come a time when the stripping work will have been completed and there will still remain a large quantity of ore fully stripped, after which the stockholders will indirectly have returned to them the amount which has been tied up in deferred charges for advance stripping.

### **Statement of Profits**

Net profit for the year was \$3,483,886.33, and dividends amounting to \$2,999,185.49 were disbursed. The difference between the dividends and the operating profits were absorbed by \$522,790.97 written off for ore extinguishment; \$39,599.84 written off for depreciation of mine equipment; and \$24,844.26 set aside as estimated income tax for the year. This left a charge against undivided profits of \$102,534.23 on the year's operations.

An extra dividend of 50 cents per share, or \$999,722.50, was also paid on December 31st and charged to surplus account. The total dividends paid from earnings to December 31, 1913, amounted to \$12,727,861.70, and there remained in undivided profits \$3,069,643.02.

### **Consulting Engineer's Report**

In this report the consulting engineer goes into considerable detail on the following subjects, most of which were covered briefly in the president's report:

Property.

Prospecting.

Ore Reserves.

*Mining:* Under which head he gives the tons of ore mined and states what portions of the mine it came from.

*Stripping:* Under which head he gives the total yardage of stripping handled during the year as 3,100,661 cubic yards, and the total amount of stripping removed to December 31, 1913, as 11,872,320 cubic yards.

*Mining Costs:* Under which he gives the direct mining cost, exclusive of stripping.



*General:* Under which he gives in detail items of equipment purchased during the year.

*Transportation:* Under which he gives the cost of handling the ore from the mines to the plant.

*Treatment Plant:* Under this heading he gives details of recovery in the concentrator for each month of the year, and the average as compared with the previous year; also various details of the operations of the roasting plant, the reverberatory smelting plant and the converting department; also concentration and smelting costs during the year. He gives the total production of copper for the year as 64,972,829 pounds, and states that the average cost per pound was 9.99 cents, which was reduced to 9.51 cents after deducting miscellaneous earnings, and that the costs include all possible charges such as shipping, refining, marketing, legal expenses, taxes, New York and Nevada expenses, etc.

## Financial Statements

The financial statements given at the end of the report consist of the following, which are quoted in full:

### COMBINED ASSETS AND LIABILITIES

December 31, 1913

#### NEVADA CONSOLIDATED COPPER COMPANY STEPTOE VALLEY SMELTING AND MINING COMPANY NEVADA NORTHERN RAILWAY COMPANY

	ASSETS		
	Dec. 31, 1912	Dec. 31, 1913	Increase
Property, Equip. and Cons.	\$16,748,381.60	\$14,256,068.76	\$2,492,312.84*
Deferred Charges to Mining Operations . . . . .	2,738,075.27	3,276,397.24	538,321.97
Materials and Sup. on hand	684,333.41	858,730.57	174,397.16
Accounts Collectible, Pre-paid Insurance, etc. . . . .	629,531.04	269,231.15	360,299.89*
Stocks and Bonds of other Companies . . . . .	23,000.00	17,000.00	6,000.00*
Metals on hand and in transit	2,886,660.14	4,047,202.25	1,160,542.11
Cash and Cash Items . . . .	958,780.29	118,493.15	840,287.14*
	<hr/> \$24,668,761.75	<hr/> \$22,843,123.12	

\*Decrease.

	LIABILITIES		
Capital Stock Outstanding (Nevada Cons. only) . . .	\$9,997,285.00	\$9,997,285.00	_____
Bonds Outstanding(Nevada Cons. only) . . . . .	500.00	500.00	_____
Surplus (from Capital Stock and Securities sold in ex- cess of par value or cost)	8,071,578.67	7 071,850.17	\$999,728.50*
Accounts Payable (not due)	658,827.17	702,688.92	43,861.75
Unpaid Treatment on Metals (not due) . . . . .	334,664.07	607,835.79	275,171.72
Deferred Accounts . . . . .	25,499.73	141,490.38	115,990.65
Reserve Accts. for Deprec'n	2,102,723.15	853,145.17	1,249,577.98*
Undivided Profits . . . . .	3,477,683.96	3,466,327.69	11,356.27*
	<hr/> \$24,668,761.75	<hr/> \$22,843,123.12	

\*Decrease.

We hereby certify that the above statement is in accord with the books, which we have verified with the proper vouchers, records and other data, and in our opinion is a correct statement of the Combined Assets and Liabilities of the Nevada Consolidated Copper Company, Steptoe Valley Smelting and Mining Company, and Nevada Northern Railway Company at December 31, 1913.

LOOMIS, SUFFERN & FERNALD,  
Certified Public Accountants

New York City,  
March 16, 1914.

## STATEMENT OF ASSETS AND LIABILITIES

	ASSETS		
	Dec. 31, 1912	Dec. 31, 1913	Increase
Property:			
Cost of Mines—Less Ex- tinguishment . . . . .	\$4,383,376.91	\$3,800,585.94	\$522,790.97*
Equip. and Development	795,852.29	752,397.03	43,455.26*
Investments:			
Par Value of Stocks and Bonds of Steptoe Valley S. & M. Co. and Nevada Northern Railway Co.	10,000,000.00	9,000,000.00	1,000,000.00*
*Decrease.			

*Mining Securities*ASSETS (*continued*)

	Dec. 31, 1912	Dec. 31, 1913	Increase
Deferred Charges to Operations:			
Cost of opening up its shafts, stripping, tracks shovels, etc. . . . .	\$2,738,075.27	\$3,276,397.24	\$538,321.97
Current Assets:			
Materials and Sup. on hd.	177,408.88	235,327.48	57,918.60
Accounts Collectible, Pre-paid Insurance, etc. . .	437,562.97	128,639.31	308,923.66*
Metals on hand and in transit, . . . . .	2,886,660.14	4,047,202.25	1,160,542.11
Cash . . . . .	739,951.22	55,406.27	684,544.95*
	<hr/>	<hr/>	<hr/>
	\$22,158,887.68	\$21,355,955.52	

## LIABILITIES

Capital Stock Issued . . . .	\$9,997,285.00	\$9,997,285.00	<hr/>
Bonds Outstanding . . . . .	500.00	500.00	<hr/>
Accounts Payable (not due)	577,998.94	523,873.08	\$54,125.86*
Deferred Accounts . . . . .	4,683.75	82,968.46	78,284.71
Unpaid Treatment on Metals (not due) . . . . .	334,664.07	609,835.79	275,171.72
Surplus:			
Amount realized from Capital Stock and Securities sold in excess of par value or cost less Extra Dividends paid	8,071,578.67	7,071,850.17	999,728.50*
Undivided Profits . . . . .	3,172,177.25	3,069,643.02	102,534.23*
	<hr/>	<hr/>	<hr/>
	\$22,158,887.68	\$21,355,955.52	

\*Decrease.

We hereby certify that the above statement is in accord with the books which we have verified with the proper vouchers, records and other data, and in our opinion is a correct statement of the Assets and Liabilities of the Nevada Consolidated Copper Company at December 31, 1913.

LOOMIS, SUFFERN &amp; FERNALD,

Certified Public Accountants.

New York City,  
March 16, 1914.

**PROFIT AND LOSS**

Year Ended December 31, 1913

**GROSS REVENUE**

Copper produced 64,972,829 pounds at 14.879 cents f. o. b. Atlantic Seaboard .	\$9,667,506.44	
Gold and Silver produced .....	557,987.03	
	<hr/>	\$10,225,493.47

**OPERATING EXPENSES:**

Mining, including proportion of stripping expense .....	\$1,651,998.04	
Freight on Ore .....	843,446.36	
Milling .....	1,682,726.62	
Smelting .....	1,829,938.71	
Rent of Steptoe Plant (inc. Depreciation)	1,162,476.46	
Freight and Refining .....	943,563.95	
Selling Commission .....	97,899.75	
	<hr/>	8,212,049.89
Net Operating Profit .....		<hr/> \$2,013,443.58

**MISCELLANEOUS INCOME:**

Dividends on Investments .....	\$1,381,771.49	
Interest on Bonds .....	37,500.00	
Interest and Discount .....	38,028.96	
Rents and Miscellaneous Income, .....	13,142.30	
	<hr/>	1,470,442.75
Net Profit for the 12 months available for Dividends .....		<hr/> \$3,483,886.33

We hereby certify that the above statement is in accord with the books, which we have verified with the proper vouchers, records and other data and in our opinion is a correct statement of the Profit and Loss of the Nevada Consolidated Copper Company at December 31, 1913.

LOOMIS, SUFFERN & FERNALD,  
Certified Public Accountants.

New York City,  
March 16, 1914.

**UNDIVIDED PROFITS**

Balance at December 31, 1912 .....	\$3,172,177.25
Net Profits 12 months ended December 31, 1913 .....	3,483,886.33
	<hr/>
	\$6,656,063.58
Ore Extinguishment 12 months ended December 31, 1913 .....	\$522,790.97
Depreciation of Mine Equipment .....	39,599.84
Estimated Income Tax, 1913 .....	24,844.26
Dividends 14, 15, 16 and 17 paid in 12 months .....	2,999,185.49
	<hr/>
	3,586,420.56
	<hr/>
Balance Undivided Profits, December 31, 1913 .....	\$3,069,643.02

**CURRENT ASSETS AND CURRENT LIABILITIES**

ASSETS:	Dec. 31, 1912	Dec. 31, 1913
Metals on hand and in transit .....	\$2,886,660.14	\$4,047,202.25
Accts. Collectible, Prepaid Insurance, etc. ....	437,562.97	128,639.31
Materials and Supplies on hand .....	177,408.88	235,327.48
Cash .....	739,951.22	55,406.27
	<hr/>	<hr/>
	\$4,241,583.21	\$4,466,575.31
 LIABILITIES:		
Current Accounts .....	\$582,682.69	\$606,841.54
Treatment Charges on Metals (not due) .....	334,664.07	609,835.79
	<hr/>	<hr/>
	\$917,346.76	\$1,216,677.33
	<hr/>	<hr/>
Surplus Quick Assets .....	\$3,324,236.45	\$3,249,897.98

Current Assets do not include Stocks and Bonds in Subsidiary Companies amounting to \$10,000,000.00 on December 31, 1912, and \$9,000,000.00 on December 31, 1913.

We hereby certify that the above statement is in accord with the books, which we have verified with the proper vouchers, records and other data and in our opinion is a correct statement of the Undivided Profits and Current Assets and Current Liabilities of the Nevada Consolidated Copper Company at December 31, 1913.

LOOMIS, SUFFERN & FERNALD,  
Certified Public Accountants.

New York City,  
March 16. 1914.

## Points on Which to Base Judgment

A careful analysis of this annual report would bring out the following points on which a prospective investor could base his judgment as to the value of the stock of the company:

- (a) The directorate of the company was largely composed of men familiar with the business of mining and many of them were connected with other successful mining enterprises.
- (b) It is assumed that the report of the consulting engineer was one to command respect.
- (c) The company had paid out in dividends a total of \$12,727,861.70 or about \$6.36 per share during the first five years of operations.
- (d) The tonnage treated in 1913 amounted to 3,148,285 tons averaging 1.597% copper, from which was produced 64,972,829 pounds at a net cost after deducting miscellaneous earnings, but including all possible charges, of 9.51 cents per pound.
- (e) The net operating profit for the year amounted to \$3,483,886.33, or \$1.74 per share. Dividends were paid amounting to \$2.00 per share. The profit per ton treated amounted to \$1.07.
- (f) The ore reserves at the end of the year amounted to 39,108,590 tons, averaging 1.65% copper.
- (g) The life of the property based on present ore reserves and treating the same amount of ore per year as was treated in 1913 would be about twelve and one-half years.
- (h) A study of the financial statements shows that the current assets less current liabilities amount to \$3,249,897.98, or \$1.62 per share. In addition to this amount they show that the deferred charges to operations amount to \$3,276,397.24, or \$1.63; these would probably come back to shareholders indirectly in the future in the way of lower operating expenditures. Therefore, in addition to operating profits from ore

treated, the stockholders should receive about \$3.25 per share before the end of the life of the mine. The statement of assets also shows \$9,000,000 as investments in stocks and bonds of the Nevada Northern Railway and the Steptoe Valley Company, but no value can be placed on these at present, as their value after the mine is worked out would not be great, and is entirely problematical.

- (i) The average price received per pound for copper sold during the year was 14.879 cents, which can be taken as a fair average price for the future.
- (j) It would seem reasonable to assume that the cost in the future and the profits per pound of copper and per ton of ore will not be less than for this particular year, for the reason that 15 cents is about what might be expected as an average price for copper, and the grade of ore treated during the year is a little higher than that given as the average for ore reserves.

Briefly, then, the prospective investor could reasonably expect to receive an average of \$1.75 per share per year for twelve and one-half years, and at or before the end of the twelve and one-half years receive the \$3.25 per share mentioned under (h) above.

### **What is the "Present Value?"**

We now have the problem: What is the value of \$1.75 per year for twelve and one-half years, and what is the value today of \$3.25 due in twelve and one-half years? If we assume that 9% interest is a fair rate on an investment of this kind, and that 5% can be obtained on a sinking fund, by reference to interest tables we find that \$1.75 per year for twelve and one-half years would be worth today approximately \$11.60. By reference to similar tables we find that \$3.25 due in twelve and one-half years, discounted at, say, 8%, is worth today approximately \$1.25. A conservative estimate then of the value of a share of the stock would be \$12.85, based on ore reserves at the end of 1913. This



value is known as the *Present Value* or *Actuarial Value*, a discussion of which has already been taken up in Chapter V.

The report, however, indicates that there are some possibilities beyond the ore reserves given, as ore was still being developed. Therefore, if the investor paid, say, \$14.00 or \$15.00 per share, it should be a good and safe mining investment.

Previous to the war, when rates of interest were lower on all securities than they are at present, in figuring "present values" it had been customary to use a 6 per cent dividend rate, and 4 per cent on the sinking fund. Under these conditions, the "present value" would figure out about \$15.77 instead of \$12.85 as above.

It might be mentioned here in connection with balancesheets, that they are sometimes extremely difficult to analyze. To the investor "current assets less current liabilities" is very important, as that figure represents the working capital. Surplus, as given in the balance sheets, may or may not represent real value so far as the investor is concerned. It is merely the balance between assets and liabilities. It shows simply how much the assets exceed liabilities, and an increase in surplus, by itself, is not necessarily important. It must be determined whether such increase represents an increase in current assets or simply a marking up of capital or other assets. We refer clients to the excellent discussion of this subject of balance sheets as given in the pamphlet on "Industrial Securities."

Financial statements and company reports since the war are not so clear as before, and many charges to operations are now made which previously were placed in a suspense account and distributed more or less over the life of the mine, such as mine development, steam shovel stripping, and depletion.

## CHAPTER VIII

### RISKS AND SECURITY IN MINING INVESTMENTS

#### **Financial Growth of a Successful Mining Proposition**

Before considering in detail the question of risk and security in mining investments, it might be well to give in brief a typical financial history of a successful mining proposition:

The first step is the financing of the prospector who makes the discovery by those who "grubstake" him. The number of mines which pay from the beginning are few indeed, so that, after discovery, funds beyond the means of the prospector and of his partners must be supplied, usually by disposing of an interest in the property. Later, as development continues, still larger sums are necessary in order to install machinery and perhaps a treatment plant. If the sum required is large, the aid of bankers may sometimes, after consolidating several other properties, be called in, a stock company formed, and securities issued.

Before this, in most instances, the original discoverer has dropped out and unless the partners themselves arrange for the financing, the promoter or middleman comes into the venture, and plays his often very important part.

After successful operation for a number of years, with perhaps consolidation with other properties, profits begin to ease off and production lessen. It is at this period that, especially in the case of precious metal mines in which the ore has been erratic or pockety, the "tributor" or leaser appears, who searches for and mines ore in the old workings, paying the company a royalty on the ore he extracts. When the mine no longer attracts the leaser, the end has come and operations cease.

#### **Position of the Investor**

Herbert Hoover in his "Principles of Mining" says:

The real investor is being educated to distinguish between reputable concerns and the counters of gamesters. Moreover, yearly, men of technical

knowledge are taking a stronger and more influential part in mining finance and in the direction of mining and exploration companies. The net result of these forces will put mining on a better plane. With proper reports a novice should be able to judge of the intrinsic position of the property. Failure to provide such data will some day be understood as a *prima facie* index of either incapacity or ignorance.

Small investors are not justified in going to the expense of having exhaustive examinations made and are forced in the main to rely, first, on their own studies of the problem; second, the reliability and reputation of the engineer reporting on the property; third, the standing of the banking house that issues the stocks or bonds; fourth, on the board of directors of the company or controlling organization; and fifth, on the management.

The investor's own study or diagnosis of the problem may be based on too incomplete data, on lack of technical knowledge on his own part, and on too little published information due to (a) youth; this latter may be due to the fact that the company has not been in existence long enough to publish annual reports; (b) that it is desirous of picking up adjoining properties and is therefore unwilling to spread broadcast its reports in detail.

### **Engineer**

The reliability and reputation of the engineer on whose report the advisability of making the venture is based are, naturally, a matter of first consideration, for on his experience, technical and commercial knowledge, and honesty, everything depends. The experience and past record of the engineer should count for much with the investor in determining the reliance to be placed on the report.

### **Bond House**

The reputation of the bond or brokerage house of issue is of the highest importance. Some excellent firms have made a specialty of bringing out mining securities, and have carefully guarded the interests of their clients in making sure that the venture was a worthy one and an attractive one for the investor.

Their main idea has been to do well for their clients and by so doing place themselves in a position of high honor and make it possible for the firm to build up a large and stable business.

Such firms do not float an issue with the sole object of making the sale a success and then avoiding further responsibility, but with the idea of continuing in the business and making it greater.

Advertising methods should be carefully studied, to see if statements made are reasonable or simply flamboyant. Some securities are brought out by groups or syndicates whose only idea is to make the deal, speculate in the securities, and then drop out entirely, with no thought of the future; while on the other hand there are groups who look on the undertaking as a permanent business and stand by it to the end. It is needless to say that the securities of the latter group would, other things being equal, be more attractive and this group would instill greater trust for proper management in the future.

## **Directorate**

The importance of a good directorate goes without saying, and in its appointment the small investor may have something to say later, but in the beginning the bankers and the mining group bringing out the securities will control:

*Management:* During the constructive period of the enterprise, it is most important to have in charge of the design, planning and carrying out of the work men of the highest caliber. The business when well established, systematized, and reduced to a routine, can be conducted by an organization whose qualities are mainly honesty and plain common sense. The gold mines of the Rand have experienced these conditions, at first employing men of great experience and ability as advisers and managers, and later, when operations were more or less standardized, men of a routine type of mind were put in charge, and so with many other gold mines. The low grade porphyry coppers in this country, however, are still in the first-named class.

## Questions Every Investor Should Ask

Questions a careful investor should go into are:

1. What is nominal capital?
2. What proportion issued?
3. What proportion of working capital is already expended and what remaining on hand?
4. What further amount may be needed?
5. Financial condition of company as to debts, etc.?
6. Annual income?
7. Dividends?
8. Application of profits?
9. Yield of ore?
10. Working costs?
11. Nature of equipment?
12. Tonnage mined and treated monthly?
13. Ore reserves?
14. Life of mine?
15. Validity of title?
16. Location of property; whether in foreign country or United States?
17. Safety of investment under laws of, and difficulties of operating in a foreign country?
18. Does chemical combination of ore present any extraordinary difficulties?

## Avoid Impractical Propositions

There are propositions, however, which are fraudulent or impractical, as illustrated by the following quotation from the "Engineering and Mining Journal" of December 31, 1903; with these of course the investor should have nothing to do:

"One form of impractical finance which is prevalent in this country is unknown in England. We refer to the organization of companies with a large nominal capital, say, 1,000,000 shares, a part of which is given out as fully paid stock in exchange for the mine, while the balance is peddled at a big discount to the public in order to secure working capital, and, in many cases, to make a quick profit for the concern at the back of the operation. Such practices are rendered impossible in England by the Companies Acts, regulations covering the organization and procedure of corporate enterprise. Under

the lax statutes obtaining in several States a syndicate can take over a small mine or a mere prospect, organize a \$1,000,000 company, pay the owners (themselves, it may be) 550,000 shares, carrying no liability, and sell the minority interest or remainder of the stock at 10 or 15 cents; sometimes even less, especially when a "Fiscal Agency," as the promoting concern is apt to call itself, represents a number of mines in course of development and "pools" the various shares so as to make a combination of "bargain" offer, in order to procure the money needed to make mines out of holes in the ground. The price of the stock is raised according to circumstances, and among these circumstances the needs of the mine are apt to be less of a measure than the facility with which the stock can be sold to simple-minded people in a fool's hurry to get rich.

There is an enormous amount of money subscribed, and mostly lost, in this way during the course of a year, especially among servant girls, clerks, railroad conductors, tradesmen and hard-working people with small salaries. Iowa, Illinois, Indiana, and the regions most out of touch with precious metal mining, are fertile fields for enterprising organizers of such schemes. Office holders of local repute, or other persons of some notoriety, are made directors and are given blocks of stock, to the intent that they may serve as lures to the people in various localities. Then reports of progress are sent in by self-constituted "experts," and "dividends" are declared, out of the subscriptions, so as to hasten the instalments on the stock; for it is usually sold on this plan, so much per month out of the earnings of comparatively poor individuals. These are the undertakings which are liberally advertised in the daily press and in the illustrated weeklies.

## Chances of Success

As in all business ventures, there are risks of all degrees in mining. As the risks are great, so should the returns be proportionately high. The following gives some idea of the relative chances in investment.

It has been stated that 95% of the commercial and industrial enterprises which are started every year ultimately prove impracticable or unsuccessful. In mining the proportion of failure is also high. Such failures include those of ventures poorly conceived, organized, and financed, as for example, small retail stores, concerns organized to introduce impracticable patents, etc., or in the case of mining, they include companies which were poorly managed or financed, which should never have been undertaken and whose securities should not have been placed on stock exchanges without careful investigation.



The reduction in the proportion of failures is considerable in the case of mining companies whose securities have been floated by financial houses of high repute. After favorable reports by engineers of experience and standing, the failures are reduced to a minimum. Companies have been formed and securities issued for what might be considered pure gambles, the venture being entered into, not because of the certainty of success but because of favorable verbal reports of a district or of a mine which it is intended to reopen, such reports being based solely on legends or romantic tales of the properties.

Other ventures, more or less of a gambling nature, are the formation of exploration companies, without real values in hand, whose aim is to seek out mines and prospects, purchase and develop already existing mines which need funds for further development or for the building of treatment plants, but which at the time of the formation of the Development Company are not contemplated. Such enterprises are presented with no fraudulent purposes in view, it being recognized by the investors that the business is more or less of a gamble and that they enter into the scheme with the idea of the possibility of a loss, but with the hope and chance of great gains.

In the case of an exploration or development company, there may be nothing tangible in view and the business is entered into purely as a speculative undertaking.

As showing the large amount of work which such exploration companies often have to do in their search for properties, the following table illustrates what a great mass of properties have to be looked into, and the proportion of propositions cast out as unattractive.

	Number of Properties		
	1913	1914	1915
Presented for consideration . . . . .	614	639	786
Rejected after office examination . . . . .	490	538	655
Subjected to preliminary field examination . . . . .	100	82	118
Accorded complete examination . . . . .	24	19	13
Properties acquired . . . . .	3	2	3
Properties taken under option . . . . .	3	1	3

### **Re-establishment of Old Mines**

A speculative venture of another kind would be the unwatering and reopening of mining properties which had not been operated for years, and the records of which had either been incomplete or lost entirely, or were not considered trustworthy. It may be that maps, assay plans, and records of production and sales were entirely missing, and that the only inducement to go into the proposition was hearsay evidence, and indications of considerable old work as shown by shafts, tunnels, dumps, etc. Many old mines in Mexico and even in the United States, were purchased, opened up, and operated on knowledge based on little more than hearsay evidence. Such mines are always supposed to contain great speculative features, but they are real gambles.

Again, metallurgical conditions may have changed since the mines were originally abandoned, and to such a degree as to make it seem possible to operate mines that had ceased to work on account of not having been able to make a profit formerly.

Other ventures of a speculative nature, but with greater chances of success, are represented by certain vein mines only partially prospected, but with evidences very greatly in favor of the continuance of the ore shoots in length and depth, it not having been feasible previously to thoroughly prove the ground by thorough development. Past records of production, costs, etc., have much weight in determining the desirability of such investments, but care should be taken to discover, if possible, whether the ore-bodies were reaching their limit, or whether the ore was becoming impoverished in depth to such an extent as to be unprofitable.

### **Real Mining Investments**

A true investment proposition would be one in which the ore-body was thoroughly determined as to tonnage, length of life with treatment plant employed or promised, assurance of favorable costs of production and reasonable prices for the product, and grounds for belief in the honest and efficient conduct of its operations by the directors and management. Many

iron, coal, and low grade copper properties, and to some extent lead mines, may be included in the true investment type.

The most desirable type of all, however, is that giving a combination of the investment and the speculative features, as illustrated in the early days, and at the present time by the low grade copper mines of Utah, Nevada, Arizona, New Mexico, and Chile. When many of these properties were first put on the market, they were what might be considered truly speculative, because, while the officials and engineers believed that there was a large tonnage of ore and that it could be treated at a very handsome profit, still the operations had not been carried out on a sufficiently large scale to prove this.

However, after success began to be assured and the proposition became worthy of being placed in the investment class, there was still a considerable speculative value on account of all profitable ore not yet having been fully developed throughout the company's property, and until after this feature has been thoroughly proven, it is not possible to leave out the speculative element and look on the proposition as one truly in the investment class alone.

Of course, with most raw metals, as is the case also with manufactured products, there is always the great question of price, cost, and demand and supply, and these should be recognized when the investment is under consideration.

Thirty or forty years ago, practically all mining propositions, with the possible exception of some of coal and iron, were considered as absolute gambles, and anyone investing in them was thought to be a speculator of the wildest type. It was not considered right for anyone to go into such propositions unless he could stand the loss of what he invested; in other words, he should be ready to "kiss his money good-bye" when he made his purchase.

Today, however, due to greater knowledge of ore deposits, more men skilled in the business of mining, and a greater trust in those engaged in such pursuits, mining has come to be considered a legitimate business in which investments can be made with safety and with as much certainty as in many manufacturing or commercial enterprises; but the investor should go into the

business, not in the old-fashioned, happy-go-lucky spirit, but after thoroughly considering the value of the property and the ability and integrity of the officials who are to be responsible for the conduct of the business as outlined herein.

### **Mining Investments Compared with Others**

On account of risk inherent in mining, the dividend rate should be higher than is usual for railway or high-class utilities and industrials. Some companies have accumulated amortization funds and diverted these funds for the purchase of other mining properties, thus continuing the functions of the organization beyond the life contemplated for the original ore-bodies, but the investor of the mining type prefers to do his own investing of funds.

Other things being equal, of securities of two properties with equal amounts of ore and of the same grade, the one having speculative chances of still further ore being developed in future should sell for a higher price than the other, the ore-bodies of which were completely developed.

It must be realized that, unlike the case of railways, manufacturing or agricultural enterprises, the assets of a mining company are what are known as "wasting assets." As the ore is extracted, the reserves are depleted and there is nothing to replace such loss. In other words, the capital is drawn upon and the dividends should be great enough not only to pay a good rate of interest, but also to provide for the return of the principal.

There are a few companies, however, whose prospective life is so great that for all practical purposes depletion need not be considered. Illustrative of this point may be mentioned Chile Copper, and Braden Copper, whose ore reserves, on the basis of the capacity of the treatment plants contemplated, have very long lives.

The old-time fable that mining ventures are inherently gambles, and therefore dangerous, still holds in the minds of many, but our increased knowledge of ore-bodies, improved methods of mining and metallurgical treatment, good and honest management, has of late years placed mining in the list of safe and attractive business enterprises, which, of course, require proper care and study of the proposition before entering into the venture, such as any business should demand.

## TEST QUESTIONS

### “MINING SECURITIES”

1. What knowledge is necessary in making investments in Mining Securities?
2. What factors should be studied carefully to reach a sound basis as to the worth of a Mining Property?
3. What should a good Mining Prospectus show?
4. What must an investor look for in annual reports of Mining Properties?
5. What must an investor determine before even considering a Mining Investment?
6. What are the particular points in an annual report on which the investor may base his judgment as to the value of his stock?
7. What is “Present Value,” and what is its value to the investor?
8. What should an investor consider in a going Mining Enterprise outside of the details of the annual reports?
9. What are the questions that every investor must ask himself on every Mining Investment he may have under consideration?

# KEY PROBLEM

## FOR

### TEXT ON MINING SECURITIES

Take either the last annual report of the Chile Copper Company or the figures and information given in the Standard Statistics Card File on this company (available in most brokerage houses) and determine the following:

1. Capitalization.
2. Character of Capitalization.
3. Adequacy of Working Capital.
4. Financial Condition as regards Debts.
5. Annual Income.
6. Dividends.
7. Yield of Ore.
8. Working Costs.
9. Nature of Equipment.
10. Ore Reserves.
11. Probable Life of Mine.
12. Management.
13. Location of Property.
14. General Conclusions.





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